Hair testing and doping control in sport
P. Kintz (Strasbourg, France) ... 109
Life and death in the genesis of the tumour cell
D.J. Harrison (Scotland, UK) ... 115
Release of mitochondrial cytochrome *c* is upstream of caspase activation in chemical-induced apoptosis in human monocytic tumour cells
J. Zhuang, G.M. Cohen (Leicester, UK) ... 121
The CD95(APO-1/Fas)/ CD95L system
P.H. Krammer (Heidelberg, Germany) ... 131
Intracellular ATP, a switch in the decision between apoptosis and necrosis
P. Nicotera, M. Leist, E. Ferrando-May (Konstanz, Germany) ... 139
Recent advances in understanding the molecular basis of polymorphisms in genes encoding cytochrome P450 enzymes
A.K. Daly, K.S. Fairbrother, J. Smart (Newcastle upon Tyne, UK) ... 143
Polymorphism of phase II enzymes: identification of new enzymes and polymorphic variants by database analysis
P. Board, A. Blackburn, L.S. Jermiin, G. Chelvanayagam (Australian Capital Territory, Australia) ... 149
Functional consequences of polymorphism of xenobiotic metabolising enzymes
M. Ingelman-Sundberg (Stockholm, Sweden) ... 155
The study of xenobiotic-metabolizing enzymes and their role in toxicity in vivo using targeted gene disruption
F.J. Gonzalez (Bethesda, MD, USA) ... 161
Polymorphic *CYP* genes and disease predisposition—what have the studies shown so far?
M. Watanabe (Iwate, Japan) ... 167
Polymorphisms in xenobiotic conjugation and disease predisposition
J. Brockmöller, I. Cascorbi, R. Kerb, C. Sachse, I. Roots (Berlin, Germany) ... 173
Genetic susceptibility: significance in risk assessment
C.J. Portier, D.A. Bell (Research Triangle Park, NC, USA) ... 185
In vitro biological activity and toxicity of tetanus and botulinum neurotoxins
R. Pellizzari, O. Rossetto, P. Washbourne, F. Tonello (Padova, Italy), P.L Nicotera (Konstanz, Germany), C. Montecucco (Padova, Italy) ... 191
How do snake curaremimetic toxins discriminate between nicotinic acetylcholine receptor subtypes
D. Servent, G. Mourier, S. Antil, A. Ménez (Gif-sur-Yvette, France) ... 199
In vivo and in vitro resistance to multiple anticholinesterases in *Xenopus laevis* tadpoles
M. Shapira, S. Seidman, N. Livni, H. Soreq (Jerusalem, Israel) ... 205
Neuronal nicotinic receptors modulate synaptic function in the hippocampus and are sensitive to blockade by the convulsant strychnine and by the anti-Parkinson drug amantadine
E.X. Albuquerque (Baltimore, MD, USA, Rio de Janeiro, Brazil), E.F.R. Pereira (Baltimore, MD, USA), M.F.M. Braga (Baltimore, MD, USA, Rio de Janeiro, Brazil), H. Matsubayashi, M. Alkondon (Baltimore, MD, USA) ... 211
Molecular epidemiology of human cancer
S.P. Hussain, C.C. Harris (Bethesda, MD, USA) ... 219
Epidemiology of cancer: global patterns and trends
D.M. Parkin (Lyon, France) ... 227
Carcinogenicity of metal compounds: possible role of DNA repair inhibition
A. Hartwig (Karlsruhe, Germany) ... 235
Carcinogen risk assessment. Can we harmonise?
P.N. Di Marco (Perth, WA, Australia), B.G. Priestly, K.J. Buckett (Canberra, Australia) ... 241
Immunotoxicology assessment in the pharmaceutical industry
J.H. Dean, J.R. Hincks (Malvern, PA, USA), B. Remandet (Montpellier, France) ... 247
Testing strategies in immunotoxicology
M. Pallardy, S. Kerdine, H. Lebrec (Chatenay-Malabry, France) ... 257
Risk assessment and immunotoxicology
H.Van Loveren, W.H. De Jong, R.J. Vandebriel, J.G. Vos, J. Garssen (Bilthoven, BA, Netherlands) ... 261
What are the prospects for regulation in immunotoxicology?
K.L. Hastings (Rockville, MD, USA) ... 267

Asbestos induces inflammatory cytokines in the lung through redox sensitive transcription factors
M.I. Luster, P.P. Simeonova (Morgantown, WV, USA) ... 271
Cytokines and irritant contact dermatitis
E. Corsini, C.L. Galli (Milan, Italy) ... 277
Immune and inflammatory responses in the CNS: modulation by astrocytes
M. Aschner (Winston-Salem, NC, USA) ... 283
Role of inflammatory cytokines and nitric oxide in hepatic and pulmonary toxicity
D.L. Laskin, D.E. Heck, J.D. Laskin (Piscataway, NJ, USA) ... 289
Hypothalamic interleukin-1 in physiology and pathology
G. Tringali, C.D. Russo, P. Preziosi, P. Navarra (Rome, Italy) ... 295
Allergy, asthma and the environment: an introduction
I. Kimber (Cheshire, UK) ... 301
Epidemiological analyses of the relationship between environmental pollution and asthma
H. Duhme, S.K. Weiland, U. Keil (Münster, Germany) ... 307
Experimental assessment of the influence of atmospheric pollutants on respiratory disease
H. Koren, M. O'Neill (NC, USA) ... 317
Immunobiology of dendritic cells in the respiratory tract: steady-state and inflammatory sentinels
A.S. McWilliam, P.G. Holt (West Perth, Australia) ... 323
Xenoendocrine disrupters: laboratory studies on male reproductive effects
L.E. Gray Jr. (Research Triangle Park, NC, USA) ... 331
Xenoendocrine disrupters — environmental impacts
J.P. Sumpter (Middlesex, UK) ... 337
Ah receptor agonists as endocrine disruptors: antiestrogenic activity and mechanisms
S. Safe, F. Wang, W. Porter, R. Duan, A. McDougal (College Station, TX, USA) ... 343
Dietary phytoestrogens and their role in hormonally dependent disease
L. Strauss, R. Santti, N. Saarinen, T. Streng, S. Joshi (Turku, Finland), S. Mäkelä (Turku, Finland, Stockholm, Sweden) ... 349
Redox regulation of apoptotic cell death in the immune system
M.B. Hampton, S. Orrenius (Stockholm, Sweden) ... 355
Lead-induced alterations in retinal cGMP phosphodiesterase trigger calcium overload, mitochondria dysfunction and rod photoreceptor apoptosis
D.A. Fox, L. He, A.T. Poblenz, C.J. Medrano, Y.S. Blocker (Houston, TX, USA), D. Srivastava (Baltimore, MD, USA) ... 359
Interactions of excitatory neurotransmitters and xenobiotics in excitotoxicity and oxidative stress: glutamate and lead
K.M. Savolainen, J. Loikkanen, S. Eerikäinen (Kuopio, Finland), J. Naarala (Kuopio, Finland, Munich, Germany) ... 363
Mechanisms of quinolone phototoxicity
K. Shimoda (Tokyo, Japan) ... 369
The photomutagenicity of fluoroquinolones and other drugs
E. Gocke, S. Albertini, A.A. Chételat, S. Kirchner, W. Muster (Basel, Switzerland) ... 375
Photochemical genotoxicity and photochemical carcinogenesis - Two sides of a Coin?
L. Müller, P. Kasper, B. Kersten, J. Zhang (Berlin, Germany) ... 383
Photocarcinogenicity of drugs
R.S. Stern (Boston, MA, USA) ... 389
Alternatives for morphometric and stereologic analysis in toxicopathology
Y. Collan (Turku, Finland) ... 393
Effects of human PTH(1-34) and bisphosphonate on the osteopenic rat model
T. Tanizawa, N. Yamamoto, Y. Takano, T. Mashiba, L. Zhang, S. Nishida, N. Endo, H.E. Takahashi (Niigata City, Japan), R. Fujimoto (Tokyo, Japan), M. Hori (Shizuoka, Japan) ... 399
Correlation of mechanistic data and histopathology in the evaluation of selected toxic endpoints of the endocrine system
C.C. Capen (Columbus, OH, USA) ... 405
New approaches to the quantitation of hypertrophy and hyperplasia in hepatomegaly
P. Carthew, R.E. Edwards, B.M. Nolan (Leicester, UK) ... 411

Biochemical and molecular neurotoxicology: relevance to biomarker development, neurotoxicity testing and risk assessment
L.G. Costa (Seattle, WA, USA) ... 417
Developmental neurotoxicity of polychlorinated biphenyls (PCBS): cognitive and psychomotor functions in 7-month old children
G. Winneke, A. Bucholski (Düsseldorf, Germany), B. Heinzow (Flintbek, Germany), U. Krämer, E. Schmidt, J. Walkowiak, J-A. Wiener, H-J. Steingrüber (Dusseldorf, Germany) ... 423
Biologically-based dose–response model for neurotoxicity risk assessment
W. Slikker Jr, A.C. Scallet, D.W. Gaylor (Jefferson, AR, USA) ... 429
Application of accelerated mass spectrometry (AMS) in DNA adduct quantification and identification
K.W. Turteltaub, K.H. Dingley (Livermore, CA, USA) ... 435
Use of polyclonal antibodies against carcinogen-DNA adducts in analysis of carcinogenesis
T. Shirai, S. Takahashi, L. Cui, Y. Yamada (Nagoya, Japan), M. Tada (Aichi, Japan), F.F. Kadlubar (Jefferson, AR, USA), N. Ito (Nagoya, Japan) ... 441
PCR-based approaches to adduct analysis
G.P. Pfeifer, M.F. Denissenko (Duarte, CA, USA), M-S. Tang (Smithville, TX, USA) ... 447
DNA binding of tamoxifen and its analogues: identification of the tamoxifen-DNA adducts in rat liver
H. Rajaniemi, M. Koskinen (Huddinge, Sweden), E. Mäntylä (Turku, Finland), K. Hemminki (Huddinge, Sweden) ... 453
Knockout animals in toxicology: assessment of toxin bioactivation pathways using mice deficient in xenobiotic metabolizing enzymes
T. Pineau, P. Costet, O. Puel (Toulouse Cedex, France), A. Pfohl-Leszkowicz (Auzeville-Tolosane, France), P. Lesca, M. Alvinerie, P. Galtier (Toulouse Cedex, France) ... 459
The transgenic Tg.AC mouse model for identification of chemical carcinogens
R.W. Tennant, R.R. Tice, J.W. Spalding (Research Triangle Park, NC, USA) ... 465
Validation of transgenic mice harboring the human prototype c-Ha-*ras* gene as a bioassay model for rapid carcinogenicity testing
S. Yamamoto (Kanagawa, Japan, Tokyo, Japan), K. Urano, T. Nomura (Tokyo, Japan) ... 473
Mode of action considerations in the use of transgenic animals for mutagenicity and carcinogenicity evaluations
B.B. Gollapudi, W.T. Stott, B.L. Yano, J.S. Bus (Midland, MI, USA) ... 479
Molecular failure of apoptosis: inappropriate cell survival and mutagenesis?
G.T. Williams, M.R. Critchlow, V.L. Hedge (Staffordshire, UK), K.B. O'Hare (Chester, UK) ... 485
Mechanisms of p53-induced apoptosis: in search of genes which are regulated during p53-mediated cell death
C. Choisy-Rossi, P. Reisdorf, E. Yonish-Rouach (Fontenay-aux-Roses, Cedex, France) ... 491
Molecular and genetic basis of normal and toxicant-induced apoptosis in female germ cells
J.L. Tilly (Boston, MA, USA) ... 497
Expression of Fas system-related genes in the testis during development and after toxicant exposure
K. Boekelheide, J. Lee, E.B. Shipp, J.H. Richburg, G. Li (Providence, RI, USA) ... 503
Experimental and clinical toxicology of anticholinesterase agents
A. Moretto (Padova, Italy) ... 509
U.S. Gulf War Veterans: Service periods in theater, differential exposures, and persistent unexplained illness
P.S. Spencer, L.A. McCauley, S.K. Joos, M.R. Lasarev, T. Schuell, D. Bourdette, A. Barkhuizen, W. Johnston, D. Storzbach, M. Wynn, R. Grewenow, and Other Members of the Portland Environmental Hazards Research Centre (Portland, OR, USA) ... 515
Epidemiological association in US veterans between Gulf War illness and exposures to anticholinesterases
T.L. Kurt (Dallas, TX, USA) ... 523
Chronic effects of low level exposure to anticholinesterases - a mechanistic review
D.E. Ray (Leicester, UK) ... 527
The predictivity of the toxicity of pharmaceuticals in humans from animal data–an interim assessment
H. Olson (W. Haven, CT, USA), G. Betton (Macclesfield, UK), J. Stritar (Groton, CT, USA), D. Robinson (Washington, DC, USA) ... 535
What does the clinician want to know from the toxicologist?
D.K. Jorkasky (Philadelphia, PA, USA) ... 539

Importance of species selection in drug toxicity testing
D.M. Morton (Indiana, USA) ... 545
The international harmonisation of guidelines in the future: a viewpoint from the industry
L. Ekman (Södertälje, Sweden) ... 551
A Japanese view on a global toxicology testing program before ICH1 and after ICH4
K. Mitsumori (Tokyo, Japan) ... 557
New perspectives for alternative approaches to carcinogenicity testing: a regulator viewpoint
J.W. van der Laan (Bilthoven, The Netherlands) ... 561
Challenges in application of new approaches to carcinogenicity testing for pharmaceuticals
J. DeGeorge (Rockville, MD, USA) ... 565
Alternative methods for mechanistic studies in toxicology. Screening of hepatotoxicity of pesticides using freshly isolated and primary cultured hepatocytes and non-liver-derived cells, SIRC cells
Y. Ohno, A. Miyajima, M. Sunouchi (Tokyo, Japan) ... 569
Industry experience with alternative methods
J. LeClaire, O. de Silva (Clichy, France) ... 575
Use of biomarkers — new frontiers in occupational toxicology and epidemiology
H. Vainio (Lyon, France) ... 581
^{32}P-postlabelling of N^{6}-adenine adducts of epoxybutanediol in vivo after 1,3-butadiene exposure
C. Zhao, M. Koskinen, K. Hemminki (Huddinge, Sweden) ... 591
Hepatitis B virus-induced liver injury and altered expression of carcinogen metabolising enzymes: the role of the HBx protein
P. Chomarat (Lyon Cedex, France), J.M. Rice (Lyon, France), B.L. Slagle (Houston, TX, USA), C.P. Wild (Leeds, UK) ... 595
Critical genes as early warning signs: example of vinyl chloride
M-J. Marion (Lyon Cedex, France) ... 603
Perspectives on the past, present and future of computer prediction in toxicology
D.J. Esdaile (Sophia Antipolis, France) ... 609
Commercial toxicology prediction systems: a regulatory perspective
A.M. Richard (Research Triangle Park, NC, USA) ... 611
Integrating computer prediction systems with in vitro methods towards a better understanding of toxicology
M.D. Barratt (Bedford, UK) ... 617
Computer modeling and computational toxicology in new chemical and pharmaceutical product development
A.H. Hall (Denver and Englewood, CO, USA) ... 623
Toxicity prediction of chemicals based on structure-activity relationships
M. Nakadate (Tokyo, Japan) ... 627
Neurotoxicity of environmental chemicals and their mechanism of action
H.A. Tilson, P.R.S. Kodavanti, W.R. Mundy, P.J. Bushnell (NC, USA) ... 631
Are kinetic investigations feasible in human poisoning
A. Jaeger (Strasbourg, France) ... 637
Pharmacokinetic-pharmacodynamic relationships. How are they useful in human toxicology?
F.J. Baud (Paris, France) ... 643
Toxicokinetic and toxicodynamic aspects of organophosphorus (OP) insecticide poisoning
J.A. Vale (Birmingham, UK) ... 649
Toxicokinetics and toxicodynamics of iron poisoning
M. Tenenbein (Manitoba, Canada) ... 653
Advantages of toxicokinetics in new drug development
I. Horii (Kanagawa Pref., Japan) ... 657
Methods for xenoestrogen testing
S. Safe, K. Connor (College Station, TX, USA), K. Gaido (Research Triangle Park, NC, USA) ... 665
Methods for studying xenoestrogenic effects in birds
C. Berg, K. Halldin, B. Brunström, I. Brandt (Uppsala, Sweden) ... 671
Tiered screening and testing strategy for xenoestrogens and antiandrogens
L.E. Gray Jr. (Research Triangle Park, NC, USA) ... 677

Author index ... 681
Subject index ... 687